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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/881,299	06/13/2001	Dinesh Chopra	MI22-1747	7028

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EXAMINER	
CAO, PHAT X	
ART UNIT	PAPER NUMBER
2814	

DATE MAILED: 12/04/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/881,299	Applicant(s) CHOPRA ET AL.
	Examiner Phat X. Cao	Art Unit 2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 October 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *47-59* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *47-59* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

1. The Request for Continued Examination filed 10/17/02 in Paper No. 9 is acknowledged.

Claim Rejections - 35 USC § 112

2. Claims 55-57 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claims 55-57, the intermetallic layer comprising **Cu(3)Pd** is not supported by the original disclosure.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 47-59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tobben et al (US. 6,261,950) in view of Obeng et al (US. 6,323,131).

Tobben (Fig. 8) discloses an integrated circuit comprising: a semiconductor substrate 204; a layer 206 consisting of copper over the substrate; a layer of alloy material 212 within the copper layer, the alloy material layer 212 comprising intermetallic Cu(3)Ti or MgCu(2) (column 5, lines 38-45) and having a thickness of between about 300 to about 500 angstroms (column 5, lines 53-54); and a conductive connection 226 on the alloy layer 212 (see Fig. 9).

Tobben discloses the alloy material layer comprising Cu(3)Ti or MgCu(2), but does not disclose the alloy material layer comprising Cu(3)Pd.

However, Obeng teaches the forming of the alloy material within the layer comprising Cu, the alloy material layer comprising Cu(3)Ti or Cu(3)Pd (column 1, lines 32-40). Accordingly, it would have been obvious to alloy the copper surface to form the alloy material layer of either Cu(3)Ti or Cu(3)Pd. According to Obeng, such forming of those alloy material layers is well known in the art for preventing the copper surface from the air oxidation (column 1, lines 32-40). It also would have been obvious to reduce the thickness of the intermetallic layer 212 of Tobben from 300 angstroms to 150 angstroms as claimed because it appears that these changes produce no functional differents and therefore would have been obvious. See in re Woodruff, 919 F. 2d 1575, 1578, 16 USPQ 2d 1934, 1936 (Fed. Cir. 1990).

5. Claims 47-59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chan et al (US. 6,468,906).

Chan (Fig. 2K) discloses an integrated circuit comprising: a semiconductor substrate 12 (not shown, see Fig. 2); a layer 56 consisting of copper over the substrate; a layer of alloy

material 61 within the copper layer, the alloy material layer 61 comprising intermetallic Cu-Pd (column 4, lines 57-62); and a conductive connection 68 on the alloy layer 61.

Chan also discloses the forming of the intermetallic cap layer having a thickness of from about 50 to about 300 angstroms (column 6, lines 5-9) and formed within the layer comprising copper (see Fig. 3D). Accordingly, it would have been obvious to form the intermetallic cap layer with the thickness as set forth above because according to Chan, such thickness of the intermetallic cap layer would provide a good adhesion and diffusion barrier (column 5, lines 33-34).

Response to Arguments

6. Applicant argues that Tobben does not suggest an intermetallic layer containing copper and palladium.

Applicant's arguments are not persuasive because Obeng clearly teaches the equivalence of CuTi and CuPd for their use in the semiconductor acts as the intermetallic capping layer. The equivalence of CuTi and CuPd material used as intermetallic capping layer is also admitted by Applicant (see page 3, lines 13-16 of Applicant's specification).

Applicant further argues that Tobben discloses an intermetallic layer having a thickness of 300 angstroms, but not 150 angstroms as claimed. However, changing the thickness of the intermetallic layer from 300 to 150 angstroms would be obvious because it appears that these

changes produce no functional differents. The functional equivalent of this change is also admitted by Applicant (see page 8, lines 19-23 of Applicant's specification).

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phat X. Cao whose telephone number is (703) 308-4917. The Examiner can normally be reached on Monday through Thursday. If attempts to reach the Examiner by telephone are unsuccessfully, the Examiner's supervisor, Wael Fahmy, can be reached on (703) 308-4918.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0956. Group 2800 fax number is (703) 308-7722 or (703) 308-7724.

PC
November 29, 2002

PHAT X. CAO
PRIMARY EXAMINER